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(54) Abstract Title: Coating food grade powders to aid dispersion

- (57) An easily dispersible powder product comprises a dry powder consisting of a food grade hydrocolloid, protein non-gelatinized starch and/or salt coated with an emulsifier and/or fat. The emulsifier and/or fat comprises 2 or 55% weight of the powder. The hydrocolloid may be pectin, alginate, guar gum, locust bean gum, carrageenan, galactomannan and/or xanthan, preferably pectin. The protein may be animal or vegetable protein such as milk protein, gelatine, soya protein, pea protein and/or carob protein. The salt is preferably phosphate, citrate or lactate. The emulsifier may be an ester of a fatty acid, or a mono- and/or diglyceride. The fat is preferably of animal or vegetable origin, such as palm oil, soya oil, lard or butter fat. These coated powders may be prepared by mixing liquid emulsifier and/or fat with the core material, or by spraying the emulsifier and/or fat onto the powder. The coated powders are suitable for incorporating in cakes, soups, sauces, yogurts, whipped cream, processed cheese, ice cream, sorbet and calf milk replacement.

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**Easily dispersible powder product**

The present invention relates to an easily dispersible powder product which comprises a dry powder consisting of a food grade hydrocolloid, protein, non-pregelatinized starch and/or salt coated with a coating of an emulsifier and/or a fat, and to the method for preparing and the use thereof. Coated products according to the present invention are used in several food industry applications.

In many food industry applications powdered ingredients are mixed with liquids like water, milk, juice and other aqueous foodstuffs. It is necessary that powdered ingredients disperse evenly and easily in the liquid to provide a good quality product. If the powdered product lumps when mixed with other ingredients, characteristics of the final products are not satisfactory.

Some powdered products are difficult to disperse into a liquid, e.g. water or milk, evenly as such. When powdered products like hydrocolloids, proteins, starches or salts are dispersed in a liquid they may form lumps which are dry inside and gelatinized outside. Such lumps will take very long time to break and dissolve. In case the lumps do not break or dissolve in the liquid they may block valves in the production equipment. The lumps may also end up into final products and remain as lumps impairing the quality of the product. The lumps may be caught in filters in the process equipment as well. The lumps may also cause other problems resulting in production problems and a reduced product quality.

Furthermore, a number of food ingredients in a powdered form like hydrocolloids, proteins, starches and salts will make a lot of dust when applied, which makes the handling of the food ingredient awkward.

To improve dispersibility and to avoid such a lump formation of strongly hydrophilic ingredients various techniques have been developed. The hydrophilic components have been coated with a hydrophobic component like an emulsifier and/or a fat in order to prevent lumps from forming. By these techniques it is also possible to reduce the dust problem mentioned above.

One method is integration of hydrocolloids in an emulsifier and/or a fat using integration on a spray tower (GB 1,082,283). This method, however, requires at least 55 % of the integrated product to be an emulsifier/fat and only 45 % to be the hydrophilic component.

US 4,575,395 discloses a modified pregelatinized starch selected from the group consisting of tapioca starch, corn starch, wheat starch, potato starch, rye starch and mixtures which is coated by 0.05 to 1.0 % by weight of a food-grade emulsifier.

In many prior art applications, such as cake powder mixes, fat is added to a powder merely to mix fat and powder to have a certain needed amount of fat in the mix, not in order to improve the solubility of the product.

The present invention provides a dry product which is easily dispersible in liquids. The product according to the present invention comprising a food grade hydrocolloid, protein, non-pregelatinized starch and/or a salt is coated with an emulsifier and/or a fat. The product according to the present invention has a specific amount of emulsifier and/or fat in order to improve dispersibility and consequently to obtain easier dissolving. The coated powder material may contain one single type of ingredient or it may be a powder blend.

The coated product of the invention disperses evenly in a liquid without forming lumps. The coated product has also strongly reduced dust properties, which makes it easier to handle on an industrial scale. A product according to the present invention is used as such or an additional emulsifier and/or fat or any other food grade component can be mixed with the product according to the present invention in a post-mixing step.

The product according to the invention may be added either to cold or to hot aqueous phases. When the product is dispersed in a cold or a hot aqueous phase, heating will be required to a temperature above the melting temperature of the coating material, i.e. the emulsifier and/or the fat, to release the hydrophilic component(s) and thus bring it in the solution in the aqueous phase.

The present invention relates to an easily dispersible powder product which comprises a dry powder of a food grade hydrocolloid, protein, starch and/or salt coated with about 2 to 55 % calculated on the total product weight of an emulsifier and/or a fat. In a preferred embodiment of the invention the amount of the emulsifier and/or the fat is preferably about 5 to 50 %, more preferably about 10 to 40 %.

The hydrocolloid used in the present invention is any type of food grade hydrocolloid, such as pectin, alginic acid, guar gum, locust bean gum, carrageenan, galactomannans, xanthans etc. An especially preferred hydrocolloid used in the present invention is pectin.

The protein used in the present invention is any type of food grade protein. An animal or vegetable protein, such as milk protein, gelatine, soya protein, pea protein, carob protein etc. is preferred.

The starch used in the present invention is any type food grade non-pregelatinized starch. Native starch and chemically and/or physically modified starches, which are not pregelatinized, are preferred.

The salt used in the present invention is any food grade salt, preferably phosphate, citrate, lactate etc.

The emulsifier used in the present invention is any conventional emulsifier. A preferred emulsifier is a glyceride or an ester of a fatty acid, especially preferred glycerides are mono- and/or diglycerides.

The fat used in the present invention is any type of food grade fat or a fraction(s) of food grade fat. Vegetable and animal origin, like palm oil, soya oil, etc. and lard, butter fat etc. is preferred.

The present invention relates also to a method for preparing an easily dispersible product. An easily dispersible product according to the present invention is prepared by coating a dry powder with about 2 to 55 % calculated on the total product weight of an emulsifier and/or a fat by adding the emulsifier and/or the fat in a liquid form to a dry powder consisting of a food grade hydrocolloid, protein, starch and/or salt during the mixing of the dry ingredients to obtain an easily dispersible powder product coated with said emulsifier and/or said fat.

The equipment used in this method is any conventional mixing equipment. In a preferred embodiment of the present invention a high-speed powder blender is used. The blender used needs to have a construction that enables to install at least one and preferably more mixing heads (high speed propeller) and at least one and preferably more nozzles for injection of the premelted hydrophobic coating material like an emulsifier and/or a fat.

The powder component to be coated is placed into the mixing equipment, such as a powder blender. When the mixing equipment is running the powder component is fluidized inside the mixing equipment. The emulsifier and/or the fat is premelted if required and the emulsifier and/or fat in a liquid form is injected through the nozzles into the mixing equipment. The emulsifier and/or the fat spreads evenly in the mixing equipment and the hydrophilic material is thus coated with a thin layer of the hydrophobic material and a coated particle with hydrophobic surface properties is formed.

The thin layer of hydrophobic material crystallizes after the addition to the powder in case the emulsifier and/or the fat is solid at room temperature. The crystallization of the emulsifier and/or fat takes place in the mixing equipment. Active cooling can be used to enhance the crystallization and to obtain a satisfactory crystallization of the coating material.

Other equipment like a mixer, a fluid bed or an extruder can also be used to perform the coating procedure according to the present invention.

In one embodiment of the invention a liquid emulsifier is sprayed on a hydrocolloid powder.

An easily dispersible powder product according to the present invention is used in various applications in food industry. The product is preferably incorporated in e.g. cakes, spreads, soups, sauces, yogurts, whipped creams, processed cheeses, ice creams, sorbet ices etc.

The method and the product according to the present invention is also used in feed applications e.g. in preparing a calf milk replacer.

The invention is now illustrated with a few examples which are not to limit the scope of the claims.

#### **Reference example**

A hydrocolloid was used in making a low fat spread to give texture to the aqueous phase. Pectin was used in a conventional way in a low fat spread to give texture to the water phase. Pectin was applied by making a presolution of 5 % pectin in water. When pure pectin was added to the water a lot of dust was formed and pectin formed lumps in the water. The outside of the lumps was gelatinized and the inside remained dry.

- a) The presolution was agitated with continuous agitation in order to break the lumps. The lumps did not break easily and the agitation had to continue several hours before the lumps were broken. This slowed down the production considerably since the production of the low fat spread did not proceed before the agitation was finished.
- b) The presolution of pectin having unbroken pectin lumps was used in a low fat spread. The pectin did not function as supposed and thus the low fat spread was unstable and separated into oil and water phases. Undissolved pectin agglomerates were found in the spread in the form of gel-like pectin agglomerates.

### Working Example

Pectin was coated with 15 % emulsifier (monodiglyceride) calculated on the total product weight in a powder blender equipped with a mixing head (a high speed -propeller) and with nozzles installed for spraying melted emulsifier. The dry pectin was placed in the powder blender and the powder blender was started. The melted emulsifier was fed slowly into the blender through the nozzles and thus the emulsifier coated the pectin particles. The emulsifier crystallized immediately and a homogenous emulsifier coated pectin powder was formed.

The coated pectin was used in the preparation of a low fat spread. The coated pectin was added to the water to make a presolution of 5 % pectin in water. When the pectin was poured into the water practically no dust was formed. The product formed immediately a homogenous suspension and no lumps were formed. The water phase was heated so that the emulsifier melted and the pectin went in the solution. The heated pectin/emulsifier slurry was used in the production of a low fat spread. The quality of the spread was far better than using the lumped pectin solution and the emulsifier added separately.

The present invention has been illustrated in detail by the above example. It is evident to those skilled in the art that the invention may be used in many different ways and many different applications.

**Claims**

1. An easily dispersible powder product **characterized** in that said product comprises a dry powder of a food grade hydrocolloid, protein, non-pregelatinized starch and/or salt which has a coating of about 2 to 55 % calculated on the total product weight of an emulsifier and/or a fat.
2. An easily dispersible powder product according to claim 1 **characterized** in that the amount of said emulsifier and/or fat is about 5 to 50 %, preferably about 10 to 40 % calculated on the total product weight.
3. An easily dispersible powder product according to claim 1 **characterized** in that said hydrocolloid is pectin, alginate, guar gum, locust bean gum, carrageenan, galactomannan and/or xanthan, preferably pectin.
4. An easily dispersible powder product according to claim 1 **characterized** in that said protein is animal or vegetable protein, such as milk protein, gelatine, soya protein, pea protein and/or carob protein.
5. An easily dispersible powder product according to claim 1 **characterized** in that said starch is native or chemically or physically modified starch.
6. An easily dispersible powder product according to claim 1 **characterized** in that said salt is phosphate, citrate or lactate.
7. An easily dispersible powder product according to claim 1 **characterized** in that said emulsifier is a glyceride or an ester of a fatty acid.
8. An easily dispersible powder product according to claim 7 **characterized** in that said emulsifier is a mono- and/or diglyceride.
9. An easily dispersible powder product according to claim 1 **characterized** in that said fat is of vegetable and/or animal origin, such as palm oil, soya oil, lard or butter fat.
10. A method of preparing an easily dispersible powder product **characterized** in that a dry powder comprising a hydrocolloid, protein, non-pregelatinized starch and/or salt is coated with an emulsifier and/or a fat by adding said emulsifier and/or said fat in a liquid form to said dry powder while mixing said dry powder to obtain an easily dispersible powder product coated

with said emulsifier and/or said fat in an amount sufficient to provide on said powder about 2 to 55 % calculated on the total product weight of said emulsifier or fat.

11. A method according to claim 10 **characterized** in that said emulsifier and/or fat is melted before blending with said powder.

12. A method according to claim 10 **characterized** in that the amount of said emulsifier and/or fat is about 5 to 50 %, preferably 10 to 40% calculated on the total product weight.

13. A method according to claim 10 **characterized** in that crystallization of said emulsifier and/or fat is enhanced by cooling.

14. A method according to claim 9 **characterized** in that the coating is performed in a powder blender having at least one mixing head and that said emulsifier and/or fat is injected to the equipment through at least one nozzle.

15. A method according to claim 9 **characterized** in that coating is performed in a mixer, a fluid bed and/or an extruder.

16. A method according to claim 9 **characterized** in that a liquid emulsifier is sprayed on a hydrocolloid powder.

17. Use of an easily dispersible powder product according to claim 1 **characterized** in that the product is incorporated in a cake, spread, soup, sauce, yogurt, whipped cream, processed cheese, ice cream, sorbet ice and/or calf milk replacer.

18. A powder substantially as described herein with reference to the Example.

19. A method for preparing a powder substantially as described herein with reference to the Example.



Application No: GB 0210223.4  
Claims searched: 1-19

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**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:  
UK Cl (Ed.T): A2B (BKX)  
Int Cl (Ed.7):  
Other: Online: WPI, EPODOC, PAJ

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
X	GB 1252206 (KRAFTCO CORP) see especially page 2 lines 7-19 and 95-118, page 3 lines 45-59 and example I	1-4,5,9,10, 11,12,13, 15 & 17
X	GB 1185340 (GENERAL FOODS CORP) see especially page 1 lines 75-81, page 2 lines 86-92, page 3 lines 30-34 and 72-77	1,2,4,5,10 & 16
X	GB 1082283 (AKTIESELSKABET GRINDSTED.) see especially page 1 lines 70-80, page 3 lines 27-130, page 4 lines 4-7, 56-64 and 81-96 and claim 1	1-4,7,8,10, 11,12,13 & 17
X	GB 1005825 (NESTLES PRODUCTS) see especially page 2 lines 24-64 and page 3 lines 17-26	1,2,4,7-13, 16 & 17
X	GB 859133 (BUDDING) see especially page 1 lines 72-78 and example 2	1,4,9,10 & 17
X	FR 2627955 (ROQUETTE FRERES) see abstract and page 2 lines 18-23 and page 4 lines 10-11	1,2,6,7, 10,11 & 12

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application